

BEST PRACTICE PROGRAMME

Good Practice Case Study

8

Wordsworth Court, Cockermouth Pilkington Commercial Property Ltd

Background

Pilkington Commercial Property are part of Pilkingtons, the glass and insulation manufacturers. The commercial property arm undertake three types of development — family housing, sheltered housing and industrial developments.

This development at Cockermouth is built in the grounds of a Victorian villa which has subsequently been sold for use as a hotel, and is their third sheltered housing scheme in the Lake District since 1986 — all designed by ADL Architects, Windermere.

Design and Construction

The building is three storeys high and consists of 40 two bedroom flats, 4 one bedroom flats and a communal lounge. The flats are planned on each side of a heated communal corridor. Kitchens and bathrooms are mainly internal and back onto vertical service ducts that have access from the communal corridor. Heating is by off-peak storage radiators.

Construction is loadbearing blockwork walls and precast concrete floors. The large span concrete floor planks eliminate the need for structural walls within the flats, all vertical loads being taken by the separating and external walls.

The trussed rafter roof is punctuated at intervals by windows that project above the eaves line.

The external walls are rendered and embody a wealth of architectural features including precast concrete quoins, string courses, sills and corbels. In addition, the wall is staggered in plan, to articulate each vertical group of flats.

The Energy Efficiency Package

- Dense blockwork walls with 100mm cavity filled with Dritherm (U value 0.33).
- 160mm mineral wool quilt as loft insulation (U value 0.23).
- Precast concrete ground floor with levelling screed, 25mm expanded polystyrene, vapour barrier and chipboard (U value 0.32).
- Vertical sliding timber windows with factory fitted Low E double glazing and weather-stripping (U value 1.9).
- Trickle vents in window heads. Extract fans to internal kitchens and bathrooms operating on a continuous low setting.

ENERGY

EFFICIENCY IN

NEW HOUSING



An artists impression of the finished scheme



Energy Efficiency Office
DEPARTMENT OF THE ENVIRONMENT

ARCHIVED DOCUMENT

WORDSWORTH COURT COCKERMOUTH

The window openings are carefully detailed to avoid cold bridging. 50mm expanded polystyrene is used to close the cavity at the jambs (see diagram below). The voids in the Catnic lintels were filled with insulation. At sill level, the Dritherm extends to the underside of the window board.

All Pilkington's sheltered housing schemes have used 100mm Dritherm and, despite the wet and windy Lakeland weather, there have been no reported cases of rain penetration. The design features chosen, ie external render, a 100mm wide structural cavity and detailing with protective overhangs, have all played their part in reducing the risk.

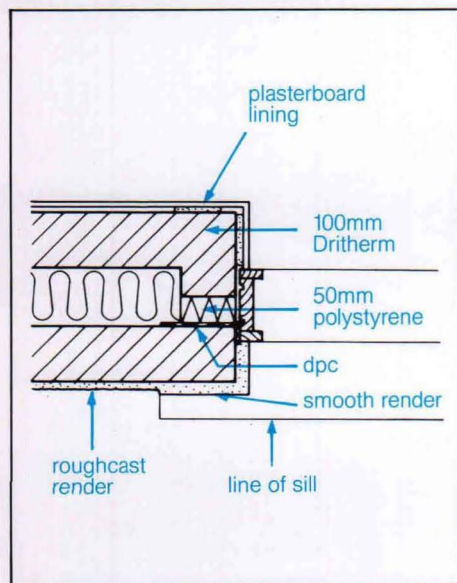
Pilkington's own research team recommended the level of insulation adopted because in their view it gave an optimum balance between energy savings and extra capital cost, without introducing undue structural or detailing problems.

Good cross ventilation of each flat is achieved by introducing fresh air through trickle ventilators in the living room and bedrooms, and extracting stale air from the kitchen and bathroom. With the extract fan on a continuous low setting, the air is changed about once every two hours.

Marketing

Pilkington sheltered housing schemes are sold on the quality of their design and low running costs. A well insulated building was seen as an integral part of the developer's aim to produce well designed and finished high quality buildings.

Many of the purchasers, who must be over 55 years of age, are on fixed incomes, so low running costs are particularly important. The selling agents emphasised the low running costs as well as the improved warmth and comfort that are a direct result of the high insulation levels. The message was further reinforced by the sales pack which contained simple details and specifications of the energy saving features. And what is the public's reaction? — according to the agents, sales were noticeably brisker than for other, less well insulated, sheltered housing schemes in the area.



Section through jamb



Avoiding a cold bridge at the lintel

Buildability

Three buildability issues arose during construction.

Insulation

The first concerned insulation at rafter level. In some parts of the roof, near the eaves, the ceiling is fixed directly to the underside of the sloping rafters. In this position, it is important to maintain the full 160mm thickness of insulation whilst maintaining sufficient air space above to ensure cross ventilation of the roof voids from eaves to eaves.

- A 200mm rafter was specified for sloping sections of ceiling.
- Glidevale units were used to ensure that the ventilation path above the insulation did not become blocked.
- The loft insulation was installed as part of the drylining contract, insulation being placed into sloping sections of the ceiling immediately before the plasterboard ceiling was fixed.

Shuttering

The second buildability issue concerned how to

provide shuttering to in-situ concrete landings. The design showed the landings supported on the inner leaf with the full thickness of Dritherm filling the cavity.

- In practice, the outer leaf was built up higher than the landing level, and rigid expanded polystyrene sheets were placed in the cavity to act as temporary shuttering. The polystyrene was later replaced with Dritherm.

Exposure of Dritherm

The third issue concerned the exposure of the Dritherm. The intricate nature of the design coupled with some 'out-of-sequence' working resulting from the use of precast concrete quoins, meant that in places the Dritherm was temporarily exposed to the weather, becoming wet and in some cases torn and ragged.

- Some form of weather protection should be used to keep the top of the Dritherm dry and prevent damage at unfinished corners.
- An alternative is to use a post fill material such as Pilkington Supercrown Blowing wool. This alternative is thought to have the additional advantages of speeding up the wall construction and improving cash flow.

Energy and Cost Savings

The BRE Domestic Energy Model (BREDEM) was used to estimate the difference in energy use between a typical 2 bedroom flat at Cockermouth and the same flat assumed to be built to the 1982 Building Regulations thermal standards. The calculations showed that the energy saving package can produce annual savings in space heating of up to 56% compared to 1982 standards and 50% compared to 1990 standards. If the flat were heated 16 hrs a day during the winter period, the estimated saving would be in the order of £75 a year heated; for 9 hours a day the saving would be nearer £70.

Building Costs

The extra cost of the energy saving package was estimated by Davis Langdon & Everest to be about £800 per flat more than the same flat built to 1989 standards and £600 more than 1990 standards. Of this, £450 was attributable to the high performance double glazing. The anticipated selling price in April 1989 was £65,000, so the extra cost for the total energy package would be about 1.25% of the selling price.

Assumptions

Estimates of annual fuel consumption for space heating, using BREDEM

Annual average external temperature:

* Solway = 9.48°C

* Midlands (UK average) = 9.54°C

Living room demand temperature = 21°C

Efficiency of storage radiator = 100%

Space heating is assumed to be 90% off-peak electricity and 10% on-peak.

Estimates of Costs and Savings from Energy Efficiency Measures

Estimates of extra capital cost are based on the Architects and Builders Price Book, edited by D L & E, and published by E & F N Spon. Costs have been adjusted for Cumbria (location factor from the Building Cost Information Service of the RICS). The insulated ground floor has been costed against a screeded floor with no floor finish applied.

Fuel cost savings are based on electricity prices of 2.1p/kWh for off-peak and 5.8p/kWh for on-peak.

Acknowledgements

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